



## Chill out

JSC's new auxiliary chiller facility is almost ready to start helping keep the center cool. Story on Page 3.



## Spaceweek's here

It's time again for the annual Spaceweek celebration of the Apollo 11 lunar landing anniversary. Story on Page 4.

# Space News Roundup

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No. 28

## Tanking test using 'baggies' to isolate leak

By Kyle Herring

A liquid hydrogen tanking test on the Space Shuttle *Atlantis* this morning is expected to isolate the leak discovered two weeks ago during a similar test at Kennedy Space Center's Launch Pad 39A.

To better isolate the leak, managers have included "baggies" around strategic locations of the disconnect area between the orbiter and external tank to contain hydrogen concentrations and pinpoint the leak.

While preparing for that test, members of the investigation team continue to delve into the history of disconnect processing, manufacture and operation as they search for the cause of the leaks discovered on *Columbia* in late May and on *Atlantis*.

Members of the investigation team, including Shuttle Program Deputy Director Leonard



### STS-38

The tests of *Columbia's* disconnect mated to its external tank counterpart have indicated leakage in the system, but as yet have not identified the exact location of the leak.

Nicholson, traveled to Rockwell International's Downey, Calif., facility this week to view testing of the disconnect hardware removed from *Columbia* and its external tank.

At this point, "we haven't eliminated any suspects," said Dr. William Lenoir, associate administrator for space flight.

The tests will continue until the leak is isolated and understood, and then *Columbia's* disconnect will be installed on the new orbiter *Endeavour*.

The shuttle flight schedule is up in the air until the leak investigation is completed. Lenoir said Tuesday, however, that he Please see **TANKING**, Page 4



JSC Photo by Mark Sowa

JSC Director Aaron Cohen welcomes Japanese Prime Minister Toshiki Kaifu and his wife, Sachiyo, to Bldg. 9B on Sunday. The prime minister and his entourage toured the Space Station *Freedom* and space shuttle mockups while in Houston for the 1990 Economic Summit of Industrialized Nations. Looking over the prime minister's shoulder is his interpreter. See another photo on Page 4.

## NASA defends testing, quality control efforts

Top NASA officials denied Tuesday that a fundamental flaw in the agency's quality control and testing philosophy caused the current problems with the space shuttle and Hubble Space Telescope (HST).

"We do not have, I believe, the wrong mindset in NASA," Deputy Administrator J.R. Thompson told the Senate Commerce Subcommittee on Science, Technology and Space.

At the hearing, called to discuss the causes of focusing problems on the telescope and a liquid hydrogen leak that has temporarily grounded the shuttles, Sen. Albert Gore, D-Tenn., said that the losing bidder on the telescope had planned an end-to-end test of HST's optical assembly. Referring to details discussed in classified testimony, Gore added that all previous optical satellite systems launched by the U.S. have undergone an end-to-end test.

"As always, if you have a problem you say that there should have been a test that found that problem," said Dr. Lennard Fisk, associate administrator for space science and applications.

But Fisk defended the decision not to test the HST's primary and secondary mirror together.

"My guess is that as we look back at this thing, we're going to find that there were other tests that we could have done and should have done that would have revealed this problem, but I don't think the end-to-end test decision was a bad one," he said. "The end-to-end test was a question

of cost, risk and what you'd learn from it."

The Senator also took issue with acceptance testing procedures used to qualify the external tank side of the 17-inch disconnect umbilical assembly. He said it appeared NASA had changed the test when the assembly didn't pass the first time.

"When there is a pattern of what looks like inadequate testing and inadequate quality assurance which ends up grounding the entire shuttle fleet, rendering the Hubble telescope crippled for at least three years and causing other problems, then the public has a right to set a very high standard before agreeing to go ahead with an ambitious new agenda which requires a very high standard in order to ensure success," Gore said.

Thompson responded that NASA is harder on itself than anyone else is and that it welcomes such oversight. He emphasized, however, that great achievements involve risk.

"There is risk in space flight. We accept that. And because of that we're taking the actions that we have to at the Cape today," he said.

Pressed by Gore about the likelihood of another serious in-flight accident within the next three years, Thompson replied there is a low probability of such an accident in the next three years, but that over the next 10 to 15 years, there probably will be at least one in-flight abort.

"I have stated it won't be too long Please see **NASA**, Page 4

## Shuttle crew commanders reassigned

By Jeff Carr

Two veteran shuttle crew commanders were removed from flight assignments Monday for violating flight crew operations guidelines.

Navy Cmdr. Robert L. "Hoot" Gibson will stand down on STS-46, the first Tethered Satellite System flight set for May 1991, and Navy Capt. David M. Walker will be replaced as commander of STS-44, a Department of Defense mission scheduled for March 1991.

Gibson was removed from the flight and from T-38 jet trainer flight

status for one year for violating a policy that restricts high risk recreational activities for astronauts named to flight crews. Walker has been suspended from T-38 flight status for 60 days for infractions of JSC aircraft operating guidelines.

Flight Crew Operations Director Don Puddy said the action was in response to Gibson's participation in an airplane race at a civilian airshow in central Texas on Saturday.

Air Force Col. Frederick D. Gregory will replace Walker as commander of STS-44. A new com-

mander for STS-46 will be assigned in the near future. Gregory flew as pilot for STS-51B in April 1985, and as crew commander for STS-33, also a dedicated Department of Defense flight, in November 1989.

"Our high-risk activity policy defines plain and simple guidelines for astronauts assigned to flight crews," Puddy said. "They are intended to preserve our crews as assigned and apply regardless of the time prior to launch."

The policy defines high-risk Please see **SHUTTLE**, Page 4

## Electricity courses through Endeavour's on-board systems

The Space Shuttle *Endeavour* was powered-on for the first time last Thursday at Rockwell International Corp.'s Orbiter Assembly Facility at Palmdale, Calif., 10 days ahead of schedule.

The initial flow of power to *Endeavour's* on-board electrical systems was a major milestone in the vehicle's construction.

The start of power-on testing marks the beginning of an eight-month test period for *Endeavour*, the fifth orbiter built by Rockwell's Space Systems Division (SSD). During the next three months, *Endeavour's* electrical systems will be energized to verify that instrumentation and systems are performing to specifications.

A final acceptance test will verify the performance of the integrated

vehicle. *Endeavour* is scheduled for roll out and delivery to NASA in April 1991, and a first flight in early 1992.

Technicians are performing final structural mating of the wings to the aft fuselage. A drag chute assembly that will aid in vehicle deceleration is being installed. Thermal protection system installations are ahead of schedule and approximately 75-80 percent complete. Aft fuselage system installations are continuing.

Major structural components remaining to be mated to the vehicle include its body flap in July; vertical stabilizer, payload bay doors and elevons in August; and forward reaction control system module in November. *Endeavour's* orbital maneuvering system pods will be installed at Kennedy Space Center.



NASA Photo

A technician checks the alignment of hydraulic lines on *Endeavour*, in preparation for welding and brazing at Rockwell International's Downey, Calif., plant.

## Hubble probe focus narrows

By Pam Alloway

Hubble Space Telescope experts Tuesday said they are closer to determining which of the telescope's two mirrors has a focusing flaw.

Ed Weiler, HST chief project scientist, said evidence thus far indicates the "spherical aberration" blurring the instrument's vision involves the telescope's 94-inch primary mirror and not the 12-inch secondary mirror. The primary mirror first captures light in the telescope.

Telescopes suffering from spherical aberration result in light striking the outer portion of the primary mirror, focusing the light on a slightly different point than light reflecting from the inner region. The result is blurred vision.

An HST Review Board met for the Please see **HUBBLE**, Page 4

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# Ticket Window

The following discount tickets are available for purchase in the Bldg. 11 Exchange Gift Store from 10 a.m. to 2 p.m. weekdays.

General Cinema (valid for one year): \$3.75 each.  
 AMC Theater (valid until May 1991): \$3.50 each.  
 Sea World (San Antonio, year long): adults, \$17.25, (2-day, \$21.95); children (3-11) \$14.75, (two-day, \$18.95).  
 Astroworld (valid 1990 season): season, \$39.95; regular, \$15.97; children, \$9.21; Waterworld, \$8.15; two-day—AW/WW, \$18.47.  
 Riverratt Trip (July 21, includes transportation, rafting, and barbecue dinner): \$35.  
 Schlitterbahn Trip (July 21, includes transportation, breakfast, lunch, 17 waterslides, paddleboats, mini golf, more): \$50.

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# Gilruth Center News

**EAA badges**—Dependents and spouses may apply for a photo I.D. 6:30 p.m.-9:30 p.m. Monday-Friday.

**Defensive driving**—Course is offered from 8 a.m.-5 p.m. Aug. 18 and Sept. 15; cost is \$15.

**Weight safety**—Required for use of weight room. The next class will be from 8-9:30 p.m. July 21; cost is \$4.

**Aerobics and exercise**—Both classes are ongoing.

**Ballroom dance**—Classes begin Aug. 2 and meet every Thursday for eight weeks. Beginning and advanced classes meet 7-8:15 p.m. Intermediate class meets 8:15-9:30 p.m. Cost is \$60 per couple.

**Scuba**—Four-week class starts July 16. Cost is \$45 at time of sign-up, plus additional fees.

**"Moonwalk" softball tournament**—Men's Open "C" tournament will be held July 21-22 at the Rec Center. Fee is \$95; deadline is 7:30 p.m. July 19.

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# Technical Library News

These new publications are available in the JSC Technical Library, Bldg. 45, Rm. 100.

*Thermal-Hydraulics for Space Power, Propulsion, and Thermal Management System Design*, American Institute of Aeronautics and Astronautics.

*Quantitative Methods in Management: Text and Cases*, R.D. Irwin.

*Disaster Recovery Planning: Managing Risk and Catastrophe in Information Systems*, John William Toigo.

*Fortran Tools for VAX/VMS and MS-DOS*, Russel K. Jones.

*Software Reuse Issues*, NASA.

*1-2-3 Tips, Tricks, and Traps*, Dick Andersen.

*Genetic Algorithms in Search, Optimization, and Machine Learning*, David E. Goldberg.

*Ionospheric Informatics and Empirical Modeling: Proceedings of Workshop XII of the COSPAR Twenty-Seventh Plenary Meeting*, Committee on Space Research.

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# Swap Shop

## Property

Sale: 12x60 Melody mobile home, good cond., \$1,700 cash. Tammy, 488-9020 or 534-2668.

Rent: Tranquility Lake, 1 BR condo, W/D, FPL, fans, sec. gate, \$400/mo. Bill, x31167 or 334-1307.

Sale: Heights, 3-2-2, remodel, CA/H, FPL, gameroom, deck, porch swing, Tom, x31418 or 863-7561.

Lease: 2-story home, 2 car gar., 10 min. to NASA, near water, \$650/mo., 3/1.5. 339-2614.

Rent: 1 BR studio in home, furn., w/frnt, near NASA, pool, flex. lease, \$385/mo. plus dep., discount for gardening ser., util. pd., ref. Mario or Sue, x32799 or 532-1725.

Sale: 2 res. lots, ea. 70x185, Wedgewood Village in Friendswood, owner fin. 482-5226.

Sale: 2-2 furn. condo, sleeps 6, hot tub, wgt. room, 45 min. from JSC, \$12K. Steve, x38204 or (409) 938-3171.

Sale: Green Acres townhome, 2-2-5-1 plus 1, \$7K assumes FHA fixed rate loan, \$680/mo. plus \$50/mo. maint fee, new AC/oven/range, 1 yr. old roof, FPL, 2 mi. from NASA, Camille, x35250 or 333-2636.

Sale: LC, 3-2-5-2, 2-story, \$65K, assum., no esc., low equity. 283-5359 or 332-3804.

Sale: Friendswood, 3-2-2 w/Gunite pool, deck, 2K sq. ft., new paint/carpet, fans, \$88,500. x34902 or 996-9128.

Sale: Countryside Sweetgum Dr., 3-2-2, new appli., fans, miniblinds, wkshp., \$61,500. Marsha, 488-4445 or 480-9308.

Sale: 2 lots, Ivanhoe Lakes, 120 mi. from CL, no flooding, camping, boating, biking bath houses, etc., \$8,750/both. Ingrid, 333-3348.

## Cars & Trucks

'81 Datsun 310 GX, 2 dr. htchbk., AM/FM cass., AC, sunroof, ex. cond., \$1,400. 332-3580.

'84 Jaguar XJS, high eff., V8, 488-2137.

'85 Ford F150 Supercab XL, V8, auto., loaded, SWB, dual tanks, 60K mi., \$6,800. Bob, x33502 or 482-0954.

'84 Olds Cutlass Supreme Brougham, 4-dr., low mi., ex. cond., \$3,450. Bob, 283-5354.

'87 Toyota PU, 32K mi., 5-sp., new tires, ex. cond., \$6,500, OBO. Kelvin, x36921 or 488-8173.

'65 Olds Starfire sport coupe, good cond., \$2K, OBO. Tom, x38298 or 488-4089.

'84 Pontiac Fiero SE, 92K mi., H/D cooling, AC, AM/FM cass., \$2,800, nego. Rick, x32695 or 559-2735.

'82 Porsche 924, ex. cond., well maint., \$5,950. 280-8796.

'80 Toyota Corolla liftback sport coupe, 5-sp., AC, or '80 Pontiac Phoenix, auto., V6, AC, ex. cond., sell one for \$1,950. x30092 or 481-3637.

'85 Pontiac 6000, 6 cyl., loaded, low mi., ex. cond., \$3,900. Jennifer, x38489 or 469-7156.

'77 Merc Monarch, 4-dr., 74K mi., ex. int., needs paint, new tires, \$700. 282-3858.

'88 Mustang conv., loaded, auto., \$11K, OBO. Chad, x35786 or 334-1852.

'78 Ford Mustang, auto., AC, runs well, \$350, OBO. Eeveleen, 282-3201 or Carl, 996-8073.

'77 Toyota Celica, stand., minor work needed, \$650. Tommy, 643-7827.

'81 Plymouth Reliant, auto., needs timing chain, \$700. Tommy, 643-7827.

'88 Dodge D1100 truck, V8, 4-sp., w/granny,

\$9K. 481-8920.

'74 Volvo 145 wagon, one owner, stand., clean. 488-7238.

'80 Chev. Citation. 482-5621.

'79 Honda Civic, stand., air not working, 1300cc, 4 cyl., 83K mi., good cond., \$500. 280-2186 or 280-0151.

'85 Buick Electra Park Ave., 4-dr., all pwr., new tires, ex. cond., 66,500 mi., \$6,600. 482-1535.

'84 Honda Civic, 4-dr., auto., ex. cond., \$3,400. Vic, 282-3216 or 334-2335.

## Cycles

'82 Harley Davidson motorcycle Sportster XLH, elec. start, ex. cond., low mi., new batt., \$2,875. x30092 or 481-3637.

'86 Honda CR80 Motocross, new crank/top end, \$500. 283-6622 or 332-4413.

'87 Honda Elite CH80 scooter, 80cc, 300 mi., ex. cond., \$500. Elena, 333-6078 or 484-3309.

'75 Honda CB750, 13K mi., new batt., elec. start, needs tune up, \$395. Mike, x38169 or 482-8496.

## Boats & Planes

'17 RMC V-bottom fishing boat, \$750. Tammy, 488-9020 or 534-2668.

Aircraft propeller, Sensenich, 74DM6-0-58, fits some Beech, Piper PA-18, PA-22, PA-28 series aircraft, \$900. 538-2299.

'16' Hobie Cat, 2 sets of sails, harnesses, traps, \$900. John, x38988 or 482-6364.

'12' Hobie Mono-Cat sailboat, trlr., 2 sails, \$400. 280-2523 or 333-1762.

Lowboy trlr., tandem axle, 17x8, new tags, \$450, OBO. 339-1337.

Gulf Coast 20 sailboat, good cond., trlr., \$2,675. 485-7629.

'17' O'Day Day Sailer, mahog. trim, bilge boards, dacron sails, spinnaker, motor mount, running lts., trlr., \$950. Mariner 4hp long shank OB, almost new, \$300. x32864 or 486-8411.

'79 Renegade 16' ski boat, 115 Evin. SST prop, trlr., ex. cond., \$2,750. 333-6868 or 486-7846.

'14' Dolphin Sr. sailboat w/trlr., ex. cond., 486-5217.

'16' outrigger canoe, trlr., ex. cond., sq. stern, ABS plastic hull, \$700. LaVon, 486-1187.

## Audiovisual & Computers

IBM XT computer, IBM HD, kybd., monitor, \$875. x30092 or 481-3637.

Apple IIc computer, monitor, Imagewriter II printer, Appleworks SW, Full Documentation, expand. RAM, joystick, \$700, nego. Steve, x30652 or 480-2998.

AT 80386 SX 16 MHz VGA monitor, 3.5 & 5.25 high den. floppies plus 40 MEG HD & 1 MEG RAM, \$1,850. x31367 or 996-1410.

IBM XT w/CGA monitor, \$800; compaq port. 2-360k disk drives, modem, \$650. Dolph, 481-2195.

IBM PC/XT w/20mb HD, 3 1/2 & 5 1/4 HD floppy drives, Orchid 286 turbo charge card, AST 6-pak premium multi-function card, SW, 640kb conven. mem. plus 384kb of LIM 4.0/EEMS mem., 2 serial ports, 1 parallel port, real time clock, CGA video board, monochrome monitor, Hayes 1200B internal modem, PC-00S 4.01, \$500. David, x32751 or 326-1069.

PC-XT, 640K, 20MB, CGA w/monitor, enh. kybd., batt. backup clock, serial & parallel ports,

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# Dates & Data

## Today

**Volcano video**—The JSC Astronomical Society will present video on the latest Kilauea eruption at 7:30 p.m. July 13 at the Lunar and Planetary Institute. Plans for the upcoming solar eclipse expeditions also will be discussed. For more information contact Anne Hawes, x36923.

**Cafeteria menu**—Special: Salisbury steak. Entrees: fried shrimp, deviled crabs, ham steak. Soup: seafood gumbo. Vegetables: buttered carrots, green beans, June peas.

## Saturday

**Lunar Rendezvous Run**—The 12th annual Ford Aerospace Lunar Rendezvous Run will start at 8 a.m. July 14 at the Gilruth Recreation Center. Entry forms are available at the gym office. Entry fee is \$15 after July 7. Those interested in volunteering for the race should contact Len Topolski, 333-5576, or Brenda Clary, 480-0257.

## Sunday

**Lunar fun fair**—The Lunar Rendezvous Fun Fair and Space Tribute will begin at 10 a.m. July 15 in Clear Lake Park. For more information, call the Spaceweek Houston Celebration Committee at 333-3627.

## Monday

**Space food lecture**—The Institute of Electrical and Electronics Engineers (IEEE) will host a space food lecture by JSC's Dr. Charles Bourland at 11 a.m. July 16 in Teague Auditorium. For more information, call Spaceweek at 333-3627.

**Spaceweek banquet**—Spaceweek will hold its 21st annual national banquet at 6:30 p.m. July 16 at the South Shore Harbour Resort & Con-

ference Center, Crystal Ballroom. Apollo 17 astronaut Dr. Harrison Schmitt will be keynote speaker with an introduction by JSC Director Aaron Cohen. Contact Tanya Lyttle, 333-3627, for more information.

**Cafeteria menu**—Special: hamburger steak. Entrees: beef Burgundy over noodles, fried chicken. Soup: cream of chicken. Vegetables: buttered corn, carrots, green beans.

## Tuesday

**Mars lecture**—The IEEE will host a lecture on "Mysterious Mars and the Evolution of Understanding" by Dr. Stephen Williams of the Lunar and Planetary Institute at 11 a.m. July 17 in Teague Auditorium. For more information, call Spaceweek at 333-3627.

**College information**—Dr. Charles Dalton of the University of Houston College of Engineering will provide information on degree programs at the UH-Clear Lake campus and the status of the master's in aerospace engineering curriculum from 3-4:30 p.m. July 17 at Bldg. 45, Rm. 304. For more information, call Beth Hall at x33078.

**Cafeteria menu**—Special: turkey and dressing. Entrees: baked meatloaf, liver and onions, barbecue spare ribs. Soup: beef noodle. Vegetables: Spanish rice, broccoli, buttered squash.

## Wednesday

**Extraterrestrial living lecture**—The IEEE will host a lecture on "Lunar and Mars Surface Systems for the Space Exploration Initiative," at 11 a.m. July 18 in Teague Auditorium. JSC's David Petri will speak. For information, call Spaceweek at 333-3627.

**JSC Astronomy Seminar**—The seminar will be an open discussion

meeting from noon-1 p.m. July 18 in Bldg. 31, Rm. 129. For more information call Al Jackson, x33709.

**Cafeteria menu**—Special: Spanish macaroni. Entrees: broiled fish, tamales with chili. Soup: seafood gumbo. Vegetables: ranch beans, beets, parsley potatoes.

## Thursday

**Lunar habitats lecture**—The IEEE will present a lecture on "Lunar Habitats" by JSC's Kriss Kennedy at 11 a.m. July 19 in Teague Auditorium. Call Spaceweek at 333-3627 for more information.

**Debris sensors**—The Solar System Exploration Division Seminar Series will present Dr. David Talent, who will speak on "The Debris Collision Warning Sensor Experiment: How it Will Help Us Understand the Orbital Debris Environment and How We Will Apply What We Learn to Space Station," at 3:30 p.m. July 19 in Bldg. 31, Rm. 129. Call Nadine Barlow, x35044, for more information.

**Cafeteria menu**—Special: chicken fried steak. Entrees: beef pot roast, shrimp chop suey, pork chops. Soup: navy bean soup. Vegetables: carrots, cabbage, green beans.

## July 20

**Space art lecture**—The IEEE will host a lecture and art exhibit on "Space Art: Windows on the Future" by SAIC's Pat Rawlings at 11 a.m. July 20 in Teague Auditorium. For more information, call Spaceweek at 333-3627.

**Space society meets**—The Houston Space Society will meet at 7:30 p.m. July 20 in Rice University's Space Science Bldg., Rm. 106. Jim Jordan will speak on "Lunar Resources." For more details call 639-4221.

## Household

Maytag 4 burner range, self cleaning oven, clock, timer, etc., almond, det. exhaust hood w/ lgt., \$250; Amana microwave, elec. timer defective, otherwise good cond., \$50. 486-0304.

Antique blanket chest, incl. chest, 2 drws., \$200; full sz. steper sofa, \$100. 996-1442.

Built in dbl. oven, top oven self cleaning, range top, \$125; built in dishwasher, \$75; cast iron sink, \$35. 488-2652.

42" round glass table w/4 padded chairs. 282-4596 or 532-1579.

Dbl. dresser, 6 drws., blue finish, \$50. Steve, x30652 or 480-2998.

6-pc. Bassett DR set, ex. cond., lighted china cab., 4 uphol. chairs, 42x66 table w/3 leaves, \$575. OBO. John, x30519.

Whirlpool washer, white, good cond., \$80; Whirlpool elec. dryer, gold, good cond., \$95; Frigidaire gas dryer, good cond., \$95; Gaffers & Sattler gas stove, ex. cond., \$100. 339-1337.

20" RCA color TV, rem. control, \$200; 19" Quasar color TV, rem. control, \$175, both ex. cond. 333-7349 or 333-1741.

GE port. dishwasher, 2 yrs. old, used 7 mos., ex. cond., \$250. 280-2595.

Heathkit 25" color TV console, \$125. Larry, 282-3161 or 996-1013.

Dbl. bed matt., box springs, \$150, OBO; all types of B/W photo paper plus chemicals. 337-4204.

2 dressers, coffee table, bkcs., fitness equip., bikes, appli. Refr., x35442.

Queen sz. matt., box springs, frame, good cond., BO; wtrbd., twin sz. w/bkcs. hdbd., sheets, pad incl., BO. 333-6456 or 480-8682.

Ethan Allen dk. pine twin hdbd., footbd., \$200; twin matt., box springs, \$150; twin comforter, matching sheets, pillow sham, \$75, all ex. cond. 944-5604.

Queen sz. wtrbd., bkcs. mirr. hdbd., 1 yr. old, \$150; round DR table, middle ped., \$130. 486-1888.

Port. GE W/D, \$275. 488-1313.

Dbl. bed hdbd., dresser w/mirr., chest of drws., night stand, \$250. Victor, x35983 or 538-1658.

## Photographic

Mamiya TZ 6x7 Polaroid back, \$250; motor winder II, \$250, both new w/warr.; Sigma 35-135mm F/3.5 for Minolta Maxxum, \$100. Joel, 282-3517 or 482-4247.

## Wanted

Want good used bike rack for roof of car, gas edger. 334-4894.

Want TV converter box. 332-0365.

Want slate pool table, good cond. 283-6600 or 332-4413.

Want Olympus OM-2 35mm SLR cam. w/ Olympus T-32 elec. flash; 28mm - 80mm zoom lens w/Olympus mount. Raymond, 534-4839.

Want players for wargames group, conflict simulation historical strategy games, The Longest Day, TSS-Gettysburg, Edward, x36250.

Want boys 20" bike. x33538 or 487-0155.

Want carpoolers, IH-45 & FM 1960. Tony Peng, x34890 or 443-7977.

Want GBC binder punch unit for church. x38039 or 333-1751.

Want heavy duty bench grinder, drill press,

air compressor. x38039 or 333-1751.

Want van pool riders, NW Houston 290 and Katy Freeway to JSC, hrs. 7:30-4:15, approx. total cost \$80/mo. Ed, 333-6963.

Want fem. roommate to share 3-2-2 house in LC, non-smoker, \$400 plus 1/2 util. Catherine, 283-4065 or 486-6711.

CL band needs drummer. 482-5031.

Orig. band needs kybd. player. Bill, x35506 or 996-5749.

## Miscellaneous

276 mint postage stamps, \$66. Jeff, 333-7010 or 483-5393.

14" EMPI aircraft alum. mag wheels, new, will fit most 4 bolt wheel patterns, \$150. 488-2652.

Chrome/gold Eldorado rims, 13" rear wheel drive only, \$100. 283-6600 or 332-4413.

'88 Mustang GTV alloy rims (4), ex. cond., \$350. 283-6622 or 332-4413.

Single matt., box springs, \$40; trampoline, 6x12, good cond., \$50. Bob, 283-5354.

Wndw. AC unit, 1 yr. old, \$130; marine radio, \$60. 332-0365.

Port. elec. typewriter, Sears model 500 w/ RS232 port, \$50. 486-8266.

Super Lobo rem. cont. car, batt. pack, stick cont., batt. chrg., \$75. Aaron Brown, 944-0493.

Stationary bike, new, \$85. x30554 or 486-4369.

52.5cm Pinarello racing bike, ex. cond., campy parts, Amer. classic seat post, turbo saddle, custom 3T bars, \$500. George, 488-6514.

Sam Snead irons, 2-5W, metal driver, bag, \$50. 474-4228.

Weaving loom, working, solid maple, flying shuttle, \$200. x32261 or (409) 925-7163.

Hibiscus plants, 482-5226.

# Chilling Out

## New auxiliary chiller facility will provide cooling power for future

By Barbara Schwartz

The newly completed auxiliary chiller facility, or Bldg. 28, is a milestone event in JSC's building plans for the next decade.

Air-conditioning requirements for future projects such as the Neutral Buoyancy Laboratory (NBL) and other space station-related building projects created a need for the additional chiller facility.

One of the most picturesque views at JSC now is from the 35-foot-tall cooling tower that overlooks the pecan grove and Clear Lake. The tower houses a cooling water cell for each chiller. Giant fans measuring 20 feet in diameter dissipate the heat collected from the chillers, and in the process evaporate about 250,000 gallons of water per day during the summer months. Each fan is driven by a 75-horsepower motor.

The base of the cells holds about six to seven feet of water treated to prevent the growth of algae. The basin must be maintained like a swimming pool to prevent clogging of pipes. The wind carries so much dirt, trash and leaves that the unit's basins collect 6 to 12 inches of mud every year, requiring draining and cleaning during the winter.

Inside the facility, carbon steel pipes carry 6,000 gallons of water per minute through the chiller which uses freon as the cooling medium. Each unit has a 2,500-kilowatt transformer to provide the power and a 1,750-horsepower motor to drive the pumps. The water is sent out to building air conditioners at 40-42 degrees Fahrenheit and returns about 10 degrees warmer. The pipes, condensers and evaporators are bound with a layer of insulation and a protective aluminum jacket.

As the equipment operates, it heats up Bldg. 28, and only the office is air conditioned. Six fans bring air in from outside to provide circulation across the equipment, and six more fans in the roof draw hot air out.

Chester Bennett has been project manager of the auxiliary chiller facility since its inception four years ago. "Schedule-wise, we started construction back in May 1989, and we had a 16-month construction period. We are about two

weeks behind that schedule. That's excellent to be able to maintain a construction schedule like that," Bennett said.

Bennett hopes employees will join him, JSC Director Aaron Cohen and Center Operations Director Ken Gilbreath for grand opening ceremonies at 1 p.m. July 23. An open house will allow employees to view the plant, on Fifth Street just north of the Bldg. 35 parking lot, until 4 p.m.

The plant office has large windows overlooking the cooling equipment. A state-of-the-art computerized control system is used to monitor, start, and stop all of the chillers, pumps, and cooling water tower equipment. Colored graphics displays with sensor readings simplify plant operations with an instant overview of what is happening within the units at all times. Future plans call for a similar control station to be installed in the existing Bldg. 24 chiller facility so eventually the chief operator can supervise both facilities from his workstation.

The operator station in Bldg. 28 will be manned around the clock when checkout is complete and the facility is operating. Although all monitoring and control can be performed from a computer terminal, the operator will be expected to leave the office to monitor data on the control panel near each chiller and closely watch the other equipment.

The control panels have lights, graphics, and buttons that make them look like something out of a futuristic film. Red and green lights indicate whether a valve is opened or closed, while a digital readout displays the percentage of opening. Other indicators give temperature readings and pertinent information on system

functioning. All of the information on the control panel is transmitted to the operator station. If an indication that something is wrong is not seen by the operator, the computer system has the capability of automatically shutting the equipment down if necessary.

Each of the chillers cost about \$1 million and its accompanying control panel, \$50,000. "You have high-value equipment here. It would be risky to operate it unmanned. The computer is great, and we can look at a lot of things, but the human

portion of it will play a big part," said Bennett, 13-year veteran with the Facility Development Division.

"The maintenance supervisor would like his operators to go out and put their hands on the equipment every now and then, listen and develop a feel for it. Just like a mother with a new baby, oper-

ators gain the same sense of physical effect—a feeling, you can tell when something is going wrong," Bennett said.

Each system in the facility is painted a specific color. The same color-coding used in Bldg. 24 is duplicated in Bldg. 28, so an operator from either building can identify the various systems immediately, making maintenance easier and faster.

"This building will give our maintenance and operations personnel some flexibility," Bennett said, referring to the seven over-taxed two-ton units in Bldg. 24. During the summer months, JSC requires about 10,000 tons of air conditioning per hour in the daytime. The two new 2,000-ton units will be able to relieve some of the workload of the 30-year-old equipment. When maintenance is required, a chiller can be shut down without affecting the ability of the

system to keep up with demand.

"About two weeks ago, we had to do some load sharing," Bennett said, because more than one of the Bldg. 24 units required maintenance at the same time. When this happens, Bldgs. 9, 10, 32, and 45 are the first to lose their air conditioning. Alternately the units in each of those buildings are briefly shut down to share the available air conditioning equitably.

Bennett said shutting down a unit even for a short period of time has the psychological effect of making people feel warmer. "You don't feel the air moving by you, and you don't hear that unit running. It makes you think it is getting hotter faster than it is," he said.

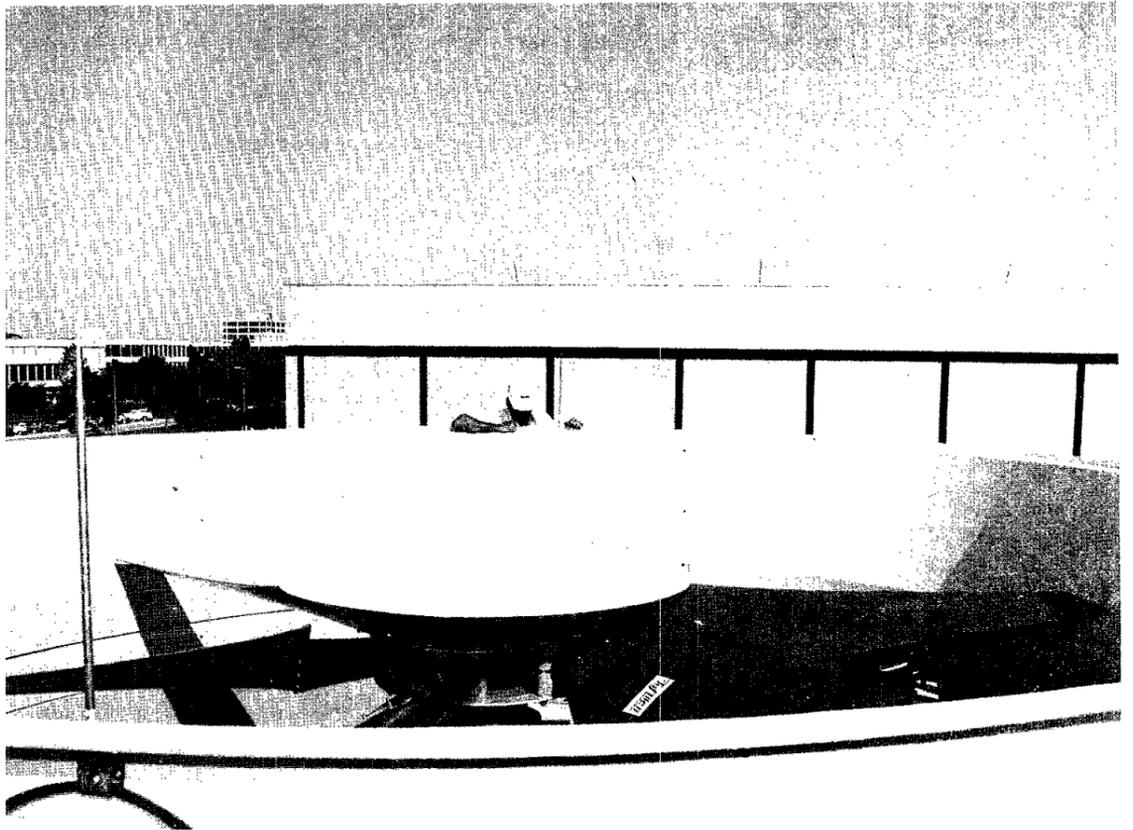
With the addition of the new chillers, this type of problem should be eliminated. Testing began this week by using one of the chillers to cool Bldgs. 7A, 8, 10 and 11. After the checkout phase, when tests show the new chillers can handle the workload intended, they will be tied into the main distribution system.

"One of the problems with chillers this size is that no manufacturer can test it in his shop. We assemble it from separate pieces and then check it out here. We think it will take about three weeks," Bennett said. "So far, the checkout has been successful with no real obstacles."

After approval and the completion of the Preliminary Engineering Report, it took eight months for the architectural firm of Lockwood, Andrews and Newman to design the project. The \$7 million construction contract was awarded to Harrop Construction.

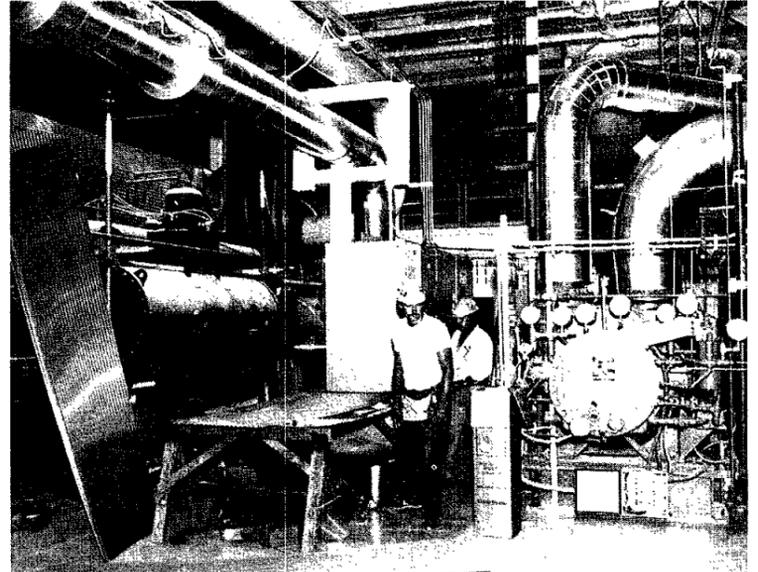
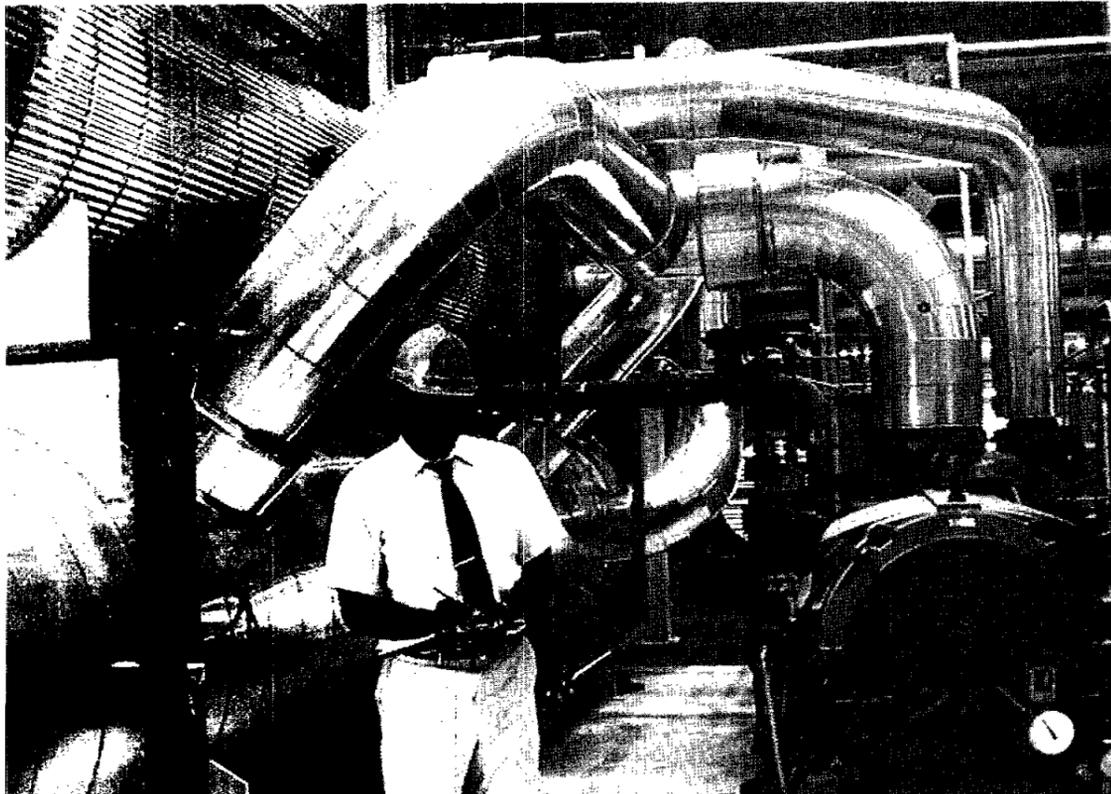
The 8,400-square-foot facility housing the two 2,000-ton chillers, piping, valves, condensers, pumps, transformers and cooling towers is built to withstand 95 mph winds and is set at an elevation of 22 feet above mean sea level, the same elevation as Bldg. 30. Plans call for a Phase II addition of another air compressor in 1991 and another chiller and a 40,000 pound boiler by 1993.

"You work on something so long, putting your ideas and creativity into the design, having discussions with other people who have input, then when it comes to actually seeing it work—there is some gratification there," Bennett said.



*The maintenance supervisor would like his operators to go out and put their hands on the equipment every now and then. . . Just like a mother with a new baby, operators gain the same sense of physical effect—a feeling, you can tell when something is going wrong.*

—Project Manager Chester Bennett



JSC Photos by Jack Jacob and Kim Murray

Top: Ed Faircloth, an inspector for Gilbane Inc., looks over one of the 20-foot-diameter fans that dissipate the heat collected by the chillers in Bldg. 28. Left: Project Manager Chester Bennett makes some final checks of the new auxiliary chiller facility's maze of pipes. Above: Workmen add protective sheathing to insulated pipes.

# What do you do when check's stuck in mail?

By Pam Alloway

You've heard the saying a hundred times—your check's in the mail. But what happens when it stays there and not in your hands?

People who work in JSC's payroll offices have encountered the problem of lost paychecks from time to time and offer some advice.

First, to avoid such a situation administrative and personnel officers strongly recommend people participate in JSC's direct deposit program which electronically transmits the money into your bank account.

But for those civil servants who opt to receive their paychecks in the mail and fail to get them the steps toward temporary relief are fairly simple. The

initial step is to contact the payroll office and explain the situation. They'll require the requestor to complete some paperwork and then ask the U.S. Treasury Department to stop payment on the original and reissue the paycheck.

In the interim, if the employee needs the paycheck money he or she can apply for a no-interest, short-term loan for the amount of the lost paycheck. That request is made to the Payroll Office which in turn works with the JSC Exchange Office in supplying those temporary funds.

"Payroll notifies us of the lost check and if it's still missing the Monday after the payroll check was due the Exchange will issue a check to the

individual for the amount of their payroll check and they'll sign a loan agreement with the Exchange," said Teresa Sullivan, Exchange Operations Manager.

This method should be used only as an emergency, officials said, and once the reissued paycheck is received the employee should endorse the check over to the NASA Exchange-JSC, thereby paying off the loan. Officials also caution that those receiving a loan should not attempt to cash the lost check if they receive it later as it will have been cancelled so a new paycheck could be issued.

This year, stop payments have been requested in 12 cases, said John Mclver, chief of JSC's Financial

Management Division. Last year there was a total of 12 stop payments, he said.

"A lot of times what has happened to the check is that people failed to put in a change of address or put it in too late," Sullivan said. "With direct deposit you don't have to put in a change request unless you change banks."

Officials say the checks frequently are held up in the mail system rather than being lost.

"Most of the time the checks will turn up," Mclver said. "We've had more problems with late checks than anything else."

Mclver said on the Wednesday after the end of a pay period payroll

personnel electronically transmit payroll information to the U.S. Treasury Department's regional disbursement center in Austin. Austin mails the check on that Thursday or Friday to people who do not participate in the direct deposit program. For those who participate in direct deposit the U.S. Treasury Department takes other necessary steps to transmit the money to JSC employees' accounts. If everything works correctly the money should be in the employee's account or mailbox by the following Tuesday.

Anyone encountering payroll check problems should contact Michelle Moore, chief of the labor distribution and payroll accounting sections, at x34851.

## NASA officials defend efforts

Continued from Page 1)

before we have another accident," Thompson said. "We're going to have many more leaks. At the flight rate over the next decade of what, 100-120 missions, very clearly at those reliabilities ... we're going to lose another one (orbiter). We're trying to be just as careful as we can."

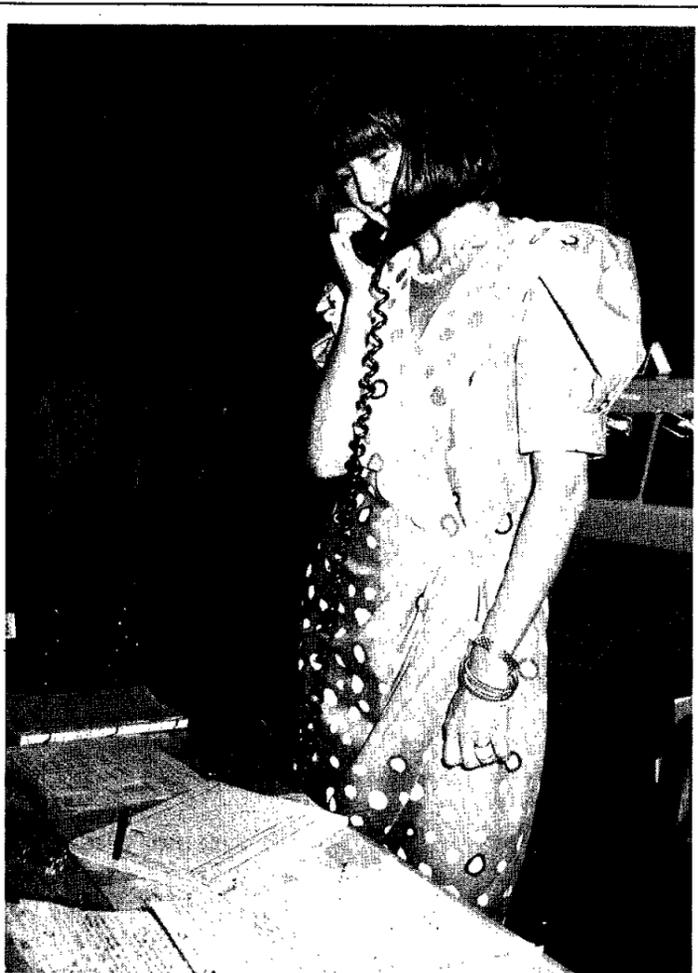
Dr. William Lenoir, associate administrator for space flight, said NASA has "broken into the chain of a potential accident" with the detection of the liquid hydrogen leak.

"We are moving forward. We will find what the leak is. We will fix the leak. And we will look back and ask ourselves what could we have done differently in the past that would have avoided ever encountering this problem."

Lenoir explained that acceptance testing of the external tank umbilicals is in two parts. In the first part, the umbilical was connected to a slave unit and various valves were cycled to assure they functioned. Then a leak check was made using the slave unit. If an out-of-specification leak was discovered, the leak check was repeated with a blanking plate that could show whether the leak was in the flight hardware or the slave unit.

In 18 out of 27 umbilicals from the same lot as those on *Columbia* and *Atlantis*, an unacceptable leak rate was found using the slave unit but not using the blanking plate.

"We did nothing different to the tank umbilical that would introduce or fix a leak," Lenoir testified. He added that 11 of those tank umbilicals flew and exhibited no leak.



JSC Photo by Mark Sowa

**CANADIAN ON CONSOLE**—Mila Mulroney, wife of Canadian Prime Minister Brian Mulroney, uses a Mission Control Center communications loop to talk with STS-41 Commander Dick Richards during a simulation. She toured JSC and Bldg. 30 Monday while in Houston for the Economic Summit. In the background is Flight Activities Officer Bob Schaf.

## Hubble problem diagnosis progressing

Alternative approaches to repairing telescope being considered

(Continued from Page 1)

first time last week. The members reported it appears there is half a wave of spherical aberration in the telescope's optical assembly. Board members are investigating ways to repair the assembly and tracing the background of the telescope's original design and manufacture. The review board is scheduled to meet again July 25.

Weiler said it will be easier to correct the problem if it is in the primary mirror.

Experts are attempting to determine which mirror was ground wrong so the correct optics can be made for replacement instruments.

"We need to determine what the right prescription is to put on that

corrective little mirror in the second Wide Field (Planetary) Camera because ... they have to put a prescription on that mirror and get back to building their instrument if they want to be ready on time," said Weiler.

Weiler said future plans for HST include loading software in early August for further testing and then, a few weeks later, using all the instruments in attempts to characterize them for science. Such attempts would include taking photographs.

During the news conference Jean Olivier, deputy project manager, also refuted reports that the U.S. Air Force had offered NASA the use of military spy satellite test facilities to conduct an end-to-end test on HST.

"No one stepped up, to my knowledge, and offered any facilities," Olivier said.

During Senate testimony Tuesday, Dr. Lennard Fisk, NASA associate administrator for space science and applications, said teams are working on ways of fixing the problem sooner than a planned 1993 spacewalk.

"We've got a lot of ingenious people out there that are thinking of other ways that you could do this thing, including on-orbit repairs," Fisk said. "Some of them are way out of sight that you wouldn't even try. But we have given absolute license to everybody in the project to think about more imaginative ways to do this than simply replacement instruments."

## Shuttle crews change

(Continued from Page 1)

recreational activities as those which involve exposure to major or fatal injury. "The race was a clear violation of the policy," he said.

Gibson flew as STS-41B pilot in February 1984, and as crew commander on STS-61C in January 1986 and STS-27 in December 1988.

Walker flew as pilot on STS-51A in 1984, and as commander of STS-30 last year.

"Dave and Hoot have each made

substantial contributions to the shuttle and space station programs, and have performed in an outstanding manner on their respective shuttle flights," said chief astronaut Daniel C. Brandenstein. "These actions are unfortunate, but they're in the best interests of us all. These policies are vitally important and are to be taken seriously."

Both Walker and Gibson can become eligible again for shuttle crew assignment following reinstatement to T-38 flight status.

## Space News Roundup

The Roundup is an official publication of the National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Texas, and is published every Friday by the Public Affairs Office for all space center employees.

Editor ..... Kelly Humphries  
Associate Editors ..... Pam Alloway  
Kari Fluegel

## Spaceweek events celebrate humans' future journeys

By Pam Alloway

Spaceweek '90 events will span the country through a network of 112 U.S. cities and the week-long celebration will include international events for the first time in its 10-year history.

This year's extravaganza will focus on the theme "The Moon, Mars and Beyond: A Journey Into Tomorrow." The theme was taken from President Bush's July 20, 1989 speech in which he outlined a plan for the United States' future in space.

The banquet will be held Monday at the South Shore Harbour Resort and Conference Center in League City. Former astronaut and senator Harrison Schmitt will be the keynote speaker. Aaron Cohen, JSC director, and H. Ray Barrett, president of Barrios Technology, also will address those attending the banquet. A reception will be held at 6:30 p.m. and dinner at 7:30 p.m. The cost is \$35.

Spaceweek is designed to explain the potential of space to the American people each July 16-24 on the anniversary of the Apollo 11 mission.

"There is a great public demand for information about all aspects of space exploration and development," said Dennis Stone, Spaceweek president. "Spaceweek events allow those with information and those interested in getting information to come together."

This year's participation of Canada, New Zealand and Northern Ireland signifies the first steps toward an annual international celebration. Displays will be set up in Vancouver, British Columbia; Auckland, New Zealand; and Armagh, Northern Ireland.

A myriad of space-related activities are planned locally. For more information on most events, call the Clear Lake Chamber of Commerce at 488-7676 or Karen McCorkle, Lunar Rendezvous Festival chairperson at 480-4512.

• The Lunar Rendezvous Antique Show will run through Saturday at Clear Lake High School, 2929 Bay Area Blvd. in Clear Lake City. Hours are 11 a.m.-8 p.m. today and 11 a.m.-6 p.m. Saturday. Admission is \$3 for adults and 50 cents for children.

• The Lunar Rendezvous Las Vegas Casino Night titled "Change Your Luck" will be held at 7 p.m. tonight at the Nassau Bay Hilton. Admission is free and play money can be purchased.

• The Lunar Rendezvous/Ford Aerospace Space Run and Walk is scheduled for 8 a.m. Saturday and will begin at JSC's Gilruth Recreation Center. This will be a 5-kilometer run.

• The Lunar Rendezvous Family Fun Fair will be held from noon to 6

p.m. Sunday in Clear Lake Park. Various aerospace companies will set up booths featuring games and food. Game tickets can be purchased.

• The Lunar Rendezvous Golf Tournament will begin at 12:30 p.m. Monday at the Bay Oaks Country Club. Call Roger Donnelly at 488-3127 for more information.

• A noontime lecture series will be held in the Bldg. 2 auditorium noon to 1 p.m. July 16-20 and is sponsored by the Galveston Bay Section of the Institute of Electric and Electronics Engineers. The time for the lecture, originally scheduled at 11 a.m., recently was changed to noon. The Roundup was notified too late to amend the Page 2 Dates and Data column. Speakers are: Monday—Dr. Charles Bourland, space food; Tuesday—Dr. Steven Williams, "Mysterious Mars"; Wednesday—David Petri, lunar and Mars surface systems; Thursday—Kriss Kennedy, lunar habitats; and Friday—Pat Rawlings, space art.

• Guided tours of Boeing Corp.'s Flight Equipment Processing Laboratory may be scheduled by reservation only from 2-3 p.m. The laboratory is at 1045 Gemini. Call Kari Thornton, 280-2028, for more information.

• The Lunar Rendezvous Wine Tasting/Silent Art Auction will begin at 6:45 p.m. Thursday at the Lakewood Yacht Club, 2425 NASA Road 1. The cost is \$25 per person and includes a commemorative goblet.

• Dr. Jim Jordan, a NASA researcher, will speak on "Utilizing Resources for the Moon" at 7:30 p.m. Friday in Rm. 106 of Rice University's Space Science Bldg. Admission is free. The session is sponsored by the Houston Space Society. Call 639-4221 for more information.

• The Lunar Rendezvous Ball will begin at 7 p.m. Saturday at the Westin Galleria Hotel in Houston. The cost is \$75 per person. The event will include dinner, drinks, dancing and the presentation of the 1990 Lunar Rendezvous princesses and queen.

• The Museum of Natural Science will sponsor a Challenger Center simulated lunar outpost mission from 9:30 a.m.-noon on various dates July 16-Aug. 16. The activity is designed for students entering fourth grade through high school. The cost is \$25 for museum members and \$30 for non-members. Call 639-4631 for more information.

Spaceweek is promoted and coordinated by Spaceweek National Headquarters, a non-profit organization based in Houston. For additional information on area events call 333-3627.

## Tanking test may isolate leak

(Continued from Page 1)

expects to launch at least one mission before STS-41. Discovery is being prepared for that mission to deploy the Ulysses solar probe in the Orbiter Processing Facility. The STS-41 mission has a specific

launch window extending from Oct. 5 to Oct. 23.

Lenoir has stated that the remainder of the 1990 launch schedule will be determined following the results of the hydrogen leak investigation.